

ANNUAL FISH PASSAGE REPORT - ROCK ISLAND COLUMBIA RIVER, WASHINGTON, 1962

by Paul D. Zimmer and John H. Broughton



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UNITED STATES DEPARTMENT OF THE INTERIOR

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Rock Island Dam, Columbia River, Wash.

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by

**Paul D. Zimmer, Fishery Biologist (Management)
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ABSTRACT

Fish using the three fishways at Rock Island Dam in 1962 were counted from May 1 to October 27. Total number of salmon and steelhead trout exceeded the 1961 count by approximately 12,300 fish.

The 1962 count of 34,154 chinook salmon was well above the mean of 16,178 for the 29-year period 1933-61 and exceeded the 1961 count by approximately 1,100 fish. The 29,253 sockeye salmon counted was approximately 10,000 more than recorded in 1961 and approximately 57 percent of the 29-year mean of 51,920. The 737 coho salmon were approximately 500 more than recorded in 1947, year of previous high count, and greatly exceeded the 50 fish in 1961. The number of steelhead trout passing Rock Island Dam in 1962 was the highest recorded since counting began in 1933 and was more than twice the 29-year mean of 3,189. Fish other than salmon and steelhead trout passing through the fishways at Rock Island Dam in 1962 numbered 164,574 and exceeded the count of salmon and steelhead trout by approximately 93,000 fish.

Of 71,735 salmon and steelhead trout observed at Rock Island Dam in 1962, approximately 0.5 percent had some visible evidence of injury about the head or body.

INTRODUCTION

This report on passage of fish at Rock Island Dam during 1962 provides information on operation of fishways and numbers of fish utilizing upstream fish passage facilities.

Rock Island Dam, located on the Columbia River approximately 12 miles downstream from the city of Wenatchee, Wash., has been in operation since 1933. The plant is owned and operated by Chelan County Public Utility District No. 1.

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Rock Island Dam is now equipped with three fishways: one located on the right bank, another on the left bank, and the third approximately in the center of the dam. Two of the fish ladders were placed in operation in 1933, and the third (middle ladder) was constructed in 1935-36. All three ladders have undergone significant modifications since initial construction.

Fish have been counted at Rock Island Dam annually since 1933--the longest continuous record in the Columbia River.

Included in this report are comments covering various fishery investigations at Rock Island Dam during 1962.

COUNTING PROCEDURES

Fish counting in 1962 began on May 1 and terminated on October 27. From May 1 through September 13, fish were counted 16 hours each day, starting at 5 a.m. and ending at 9 p.m. From September 14 through October 27, counting was reduced to conform to the hours of daylight available.

Fish counters were allowed a 15-minute rest period at the end of each hour; and during all periods of noncounting, ladders were closed to passage of fish.

ENUMERATION OF FISH

Chinook Salmon, *Oncorhynchus tshawytscha*

The 1962 chinook salmon count of 34,154 (jacks included) was well above the mean of 16,178 for the 29-year period 1933-61. It was also greater than the 1961 count, but only 67 percent of the record count of 50,713 in 1957 (table 1). Monthly totals of chinook salmon counted are given in table 2. Maximum day's count of chinook salmon, jacks not included, in 1962 was 570 on August 10 (table 3). Tables 4 and 5 show semimonthly totals of the number and percentage of chinook salmon counted over each fish ladder. Of the chinook salmon (jacks excluded) which passed Rock Island Dam in 1962, 65.6 percent ascended the left ladder, while 13.5 and 20.9 percent ascended the middle and right ladders, respectively. The count of 8 chinook salmon on May 1, 1962, is in sharp contrast to the 137 on the same date in 1961.

Chinook Salmon Jacks

Some chinook salmon return from the ocean as mature fish in the year following their seaward migration and are referred to as "jacks." These fish are small and predominantly males. It has been determined at Rock Island Dam that up to June 30 of each year, jacks rarely, if ever, exceed 18 inches in length, while other chinook salmon are much larger. Likewise, from July 1 to the end of

the season, jacks rarely, if ever, exceed 22 inches in length. Consequently, jacks at Rock Island Dam are identified as all chinook salmon 18 inches or less in length prior to July 1 and 22 inches or less in length after that date. The maximum daily count of 173 jacks occurred on August 7 (table 3). The 7,118 fish recorded as jacks constitute 20.8 percent of the 1962 chinook salmon run as compared to 28.0 percent in 1961.

Table 5 shows the number and percentage of chinook salmon jacks counted over each fish ladder. Monthly totals are given in table 2.

Sockeye Salmon, *Oncorhynchus nerka* (Blueback or Red)

The 1962 sockeye salmon count of 29,253 was 56 percent of the 29-year mean of 51,920 (table 1). In 1962, peak of the run was reached on July 21, when 2,541 fish were counted through the fishways at Rock Island Dam.

Table 6 shows semimonthly totals of the number and percentage of sockeye salmon counted over each ladder. Of the sockeye salmon passing Rock Island Dam in 1962, 48.3 percent ascended the left ladder, while 21.7 and 30.0 percent ascended the middle and right ladders, respectively. Data pertaining to sockeye salmon daily counts are in tables 9-14. Monthly totals of sockeye salmon counted in 1962 are in table 2.

Coho Salmon, *Oncorhynchus kisutch* (Silver)

The 1962 coho salmon count of 737 fish greatly exceeded the 29-year mean of 60 and the 1961 count of 50 (table 1). Additional data are shown in tables 7, 12, 13, and 14. Maximum day's count of 70 fish occurred on September 27 (table 3). In 1961, maximum day's count of 8 fish occurred on October 4. The first coho salmon appearing at Rock Island Dam in 1962 was observed 14 days prior to the initial count of this species of salmon in 1961. Of the coho salmon passing the dam in 1962, 77.3 percent utilized the left ladder, while 3.9 and 18.8 percent ascended the middle and right ladders, respectively.

Steelhead Trout, *Salmo gairdneri*

The 1962 steelhead trout count of 7,591 was almost two and one-half times greater than the 29-year mean of 3,189 (table 1). The count of 15 steelhead on May 1, 1962, was slightly more than one-third the count of 44 on the same day in 1961.

The greatest monthly number of steelhead passing through the fishways in 1962 occurred in September when 3,429 fish were recorded. Peak monthly movement of these fish in 1961 also occurred in September when 3,508 fish were counted.

Of the steelhead passing Rock Island Dam in 1962, 70.7 percent utilized the left ladder, while 12.1 and 17.2 percent ascended the middle and right ladders, respectively.

Additional data pertaining to the movement of steelhead trout at Rock Island Dam are contained in tables 8-14.

Maximum day's count in 1962 was 284 on September 28 (table 3). In 1961, maximum day's count of 269 occurred on September 19.

Table 8 shows semimonthly totals of the number and percentage of steelhead trout counted over each fish ladder.

Miscellaneous Fish

In 1962, enumeration was made of species of fish other than salmon and steelhead trout passing Rock Island Dam (tables 15-20). No claims are made as to complete accuracy of identification of these fish. It is felt, however, that the degree of accuracy is consistent with that maintained at other dams on the Columbia River and as such may be used as a rough index of abundance of these fish. In 1962, approximately 165,000 fish other than salmon and steelhead trout passed Rock

Island Dam. Species of fish included are: largescale sucker, *Catostomus macrocheilus* Girard; longnose sucker, *Catostomus catostomus* (Forster); squawfish, *Ptychocheilus oregonense* (Richardson); Rocky Mountain whitefish, *Prosopium williamsoni* (Girard); Columbia River chub, *Mylocheilus caurinus* (Richardson); chisel-mouth, *Acrocheilus alutaceus* Agassiz and Pickering; carp, *Cyprinus carpio*, Linnaeus; lamprey, *Entosphenus tridentatus* (Gairdner); shad, *Alosa sapidissima* (Wilson); Dolly Varden trout, *Salvelinus malma* (Walbaum); and rainbow trout, *Salmo gairdneri* (Richardson). The number of miscellaneous species of fish passing through the fishways was 2.3 times the total salmon and steelhead trout recorded.

WEATHER AND RIVER DISCHARGE DATA

Headwater and tailwater elevations are plotted on figures 1 and 2, respectively. Air temperatures were taken twice daily by pocket thermometer. Water temperatures were taken at the middle fish ladder by recording thermograph. Daily records of weather conditions and stream flows are shown on tables 9-14. Daily river discharge data are plotted on figure 3. Maximum daily discharge of 326,900 c.f.s. on June 5, 1962, was slightly less than two-thirds the flow of 488,500 c.f.s. on the same day in 1961. Maximum daily discharge of 526,900 c.f.s. in 1961 occurred on June 12. Maximum water temperature in 1962 of 65 degrees occurred on July 28 and 29. Maximum water temperature in 1961 of 67 degrees occurred on August 21.

ACTIVITIES AND OBSERVATIONS

As in past years of counting at Rock Island Dam, some fish were observed with cuts or abrasions on the body. Of 71,735 salmon and steelhead observed as they passed over the counting boards, 364, or approximately 0.5 percent, had injuries of some sort either on the body or about the head. Of 40,764 salmon and steelhead observed in 1961, 1.0 percent had injuries about the head or body. Since in

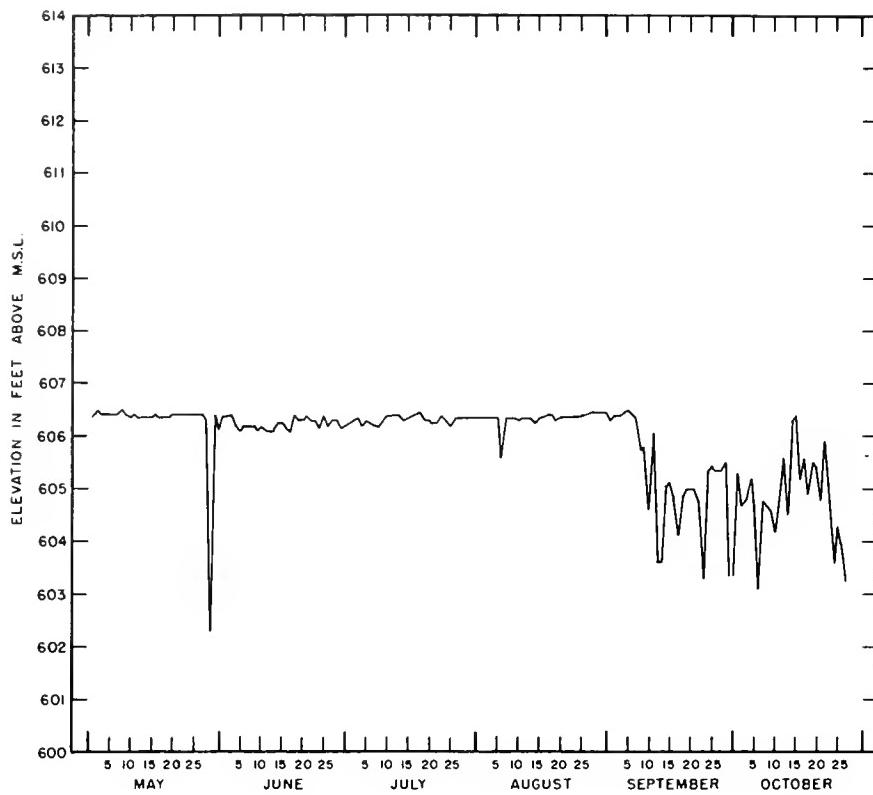


Figure 1.--Headwater elevations, Rock Island Dam, May 1 to October 27, 1962.

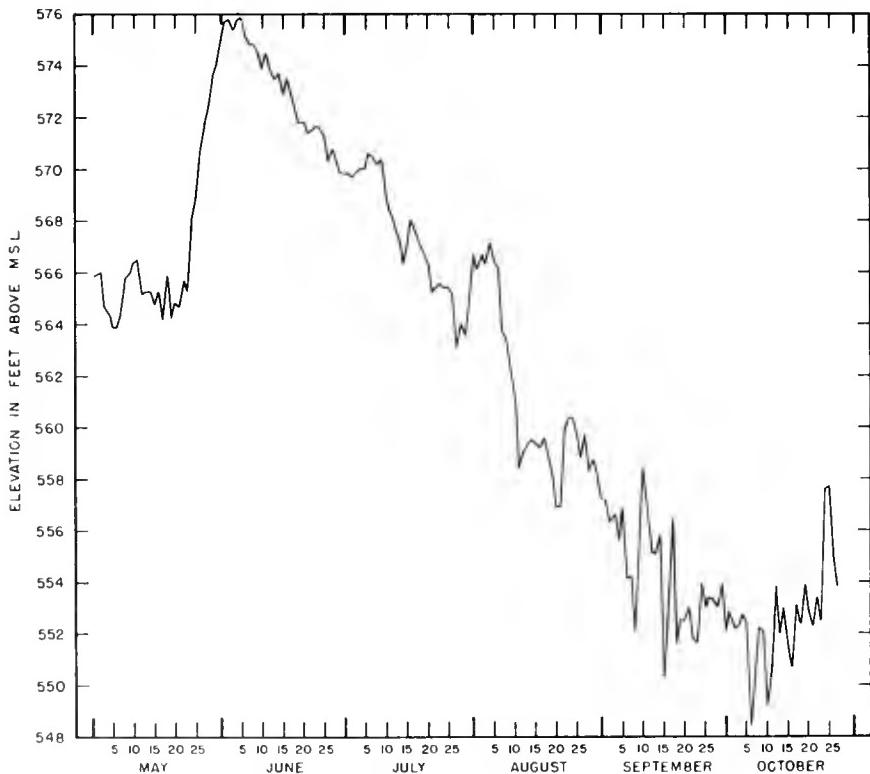


Figure 2.--Tailwater elevations, Rock Island Dam, May 1 to October 27, 1962.

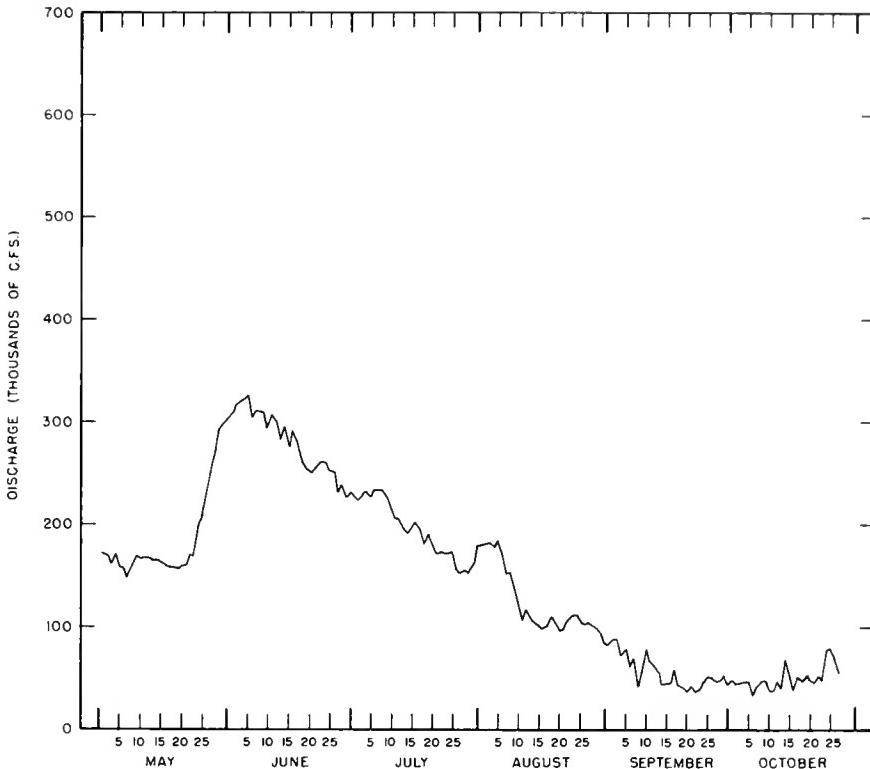


Figure 3.--Daily river discharge, Rock Island Dam, May 1 to October 27, 1962.

both years of observation the counters could see only the top and one side of the fish, the incidence of injury was probably greater than indicated. Percentages of injured fish observed in the left, middle, and right ladders in 1962 were 68, 10, and 22 percent, respectively.

In 1962, injuries were most numerous on large chinook and sockeye salmon (table 21). Of the 7,591 steelhead observed, only 16 fish showed evidence of injuries. Very few chinook salmon jacks displayed visible external injuries. It is of interest to note that of 737 coho salmon examined, only 3 fish showed evidence of visible injuries.

As in 1961, circular cuts or abrasions about 1 inch in diameter were more prevalent among the sockeye salmon. The most prevalent injury among the large chinook salmon was a deep cut along the side of the body or on the head. Some of these cuts or gashes were estimated to be as long as 6 inches and from

one-quarter to one-half inch deep. Some of the injuries were newly made, as evidenced by the presence of bloody tissue. Others appeared to have been made earlier, as scar tissue had formed. In some instances, large injuries or abrasions were covered with fungus growth. The greatest number of injuries occurred in July and August.

In the period July 17 to July 26, 1,024 sockeye salmon were trapped in the left bank fishway. These fish were tagged as part of a study to measure the effectiveness of the fishways at Rocky Reach Dam, located approximately 20 miles upstream from Rock Island Dam. All tagged fish were released into the forebay of Rock Island Dam. In the period July 21 to July 26, 16 of these tagged fish were again counted through the fishways at Rock Island Dam, indicating that some of the fish proceeded downstream after release and came up through the fishways a second time.

The five times that dewatering of the fishways at Rock Island Dam occurred in 1962 were as follows:

1. Right fish ladder, from 8:00 a.m., April 26, to 4:45 p.m., April 27, for routine maintenance work.

2. Left fish ladder, from 9:20 a.m. to 2:30 p.m., June 4, for repair of weir chains.

3. Left fish ladder, from 10:50 a.m. to 12:30 p.m., August 1, shutoff of auxiliary water to permit examination of fish ladder.

4. Right fish ladder, from 12:00 noon to 3:40 p.m., October 4, for repairs to ladder weirs.

5. Left fish ladder, October 22, closed for 50 minutes in the afternoon to permit recovery of items inadvertently dropped in fish ladder.

Frequent inspections were made of fishway operations by State and Federal personnel throughout the counting season. From May 27 to 29, studies were made by fisheries personnel and members of Chelan County Public Utility District of different spillway gate operations.

SUMMARY

1. The total Rock Island Dam count of salmon and steelhead in 1962 was 71,735, which was approximately 12,300 more than the 1961 count.

2. Annual counts of salmon and steelhead passing Rock Island Dam during the period 1933-62, inclusive, are given in table 1.

3. The chinook salmon count of 34,154 in 1962 was approximately 1,100 more than in 1961 and slightly more than one-half the peak year of 1957. In 1962, 7,118 jacks were re-

corded, representing 21 percent of that year's total of chinook salmon counted.

4. The sockeye count of 29,253, which exceeded the 1961 count by approximately 10,000 fish, was approximately 22,700 less than the 29-year mean of 51,920.

5. Very few coho salmon have appeared at Rock Island Dam in the period 1933-62. The 1962 count of 737 fish was more than three times the previous high count of 229 in 1947.

6. The steelhead count of 7,591 in 1962 was almost two and one-half times greater than the 29-year mean of 3,189 and was the highest recorded in the period 1933-62.

7. In 1962, a greater percentage of salmon and steelhead utilized the left bank fish ladder than used either the middle or right bank ladders.

8. Fish counting in 1962 began on May 1 and terminated October 27. From May 1 through September 13, fish were counted for 16 hours each day. From September 14 through October 27, counting was reduced to conform to the hours of daylight available.

9. In 1962 the maximum number of salmonids counted in 1 day (2,692) was on July 21.

10. Season's total of fish other than salmon and steelhead trout passing Rock Island Dam in 1962 was 164,574 and was composed of the following: sucker, 100,401; squawfish, 10,944; whitefish, 38,309; chub, 10,105; carp, 1,756; shad, 1; Dolly Varden and rainbow trout, 61; and lamprey, 2,997.

11. Of 71,735 fish examined, on the top and one side only as they passed over the counting boards, approximately 0.5 percent had injuries of some type either on the body or about the head. Greatest numbers of injured fish occurred in July and August. Injuries were most numerous on large chinook and sockeye salmon.

Table 1.--Annual counts and periods of counting of salmon and steelhead trout at Rock Island Dam, 1933-62¹

[Number of fish]

Year	Chinook salmon	Steelhead trout	Sockeye salmon	Coho salmon	Total	Period of count
1933	5,668	1,055	40,737	182	47,642	7/21- 9/23
1934	7,115	583	2,227	69	9,994	7/31-12/31
1935	16,305	5,418	14,013	11	35,747	1/1 -11/15
1936	7,290	2,373	16,500	0	26,163	5/5 - 9/29
1937	5,133	2,214	15,089	58	22,494	5/11-10/16
1938	5,795	2,399	17,095	78	25,367	4/12-10/29
1939	11,206	5,425	19,591	13	36,235	5/1 -12/9
1940	9,512	5,220	27,093	2	41,827	3/5 -12/10
1941	2,507	3,513	963	28	7,011	4/1 -12/8
1942	6,833	3,693	16,340	1	26,867	4/10-11/30
1943	11,129	2,315	17,522	15	30,981	4/5 -11/30
1944	3,364	1,338	5,035	186	9,923	4/12-11/17
1945	5,699	1,118	7,148	166	14,131	4/4 -12/17
1946	9,981	1,779	45,030	32	56,822	1/4 -11/5
1947	11,717	1,971	79,831	229	93,748	1/1 -11/27
1948	7,083	2,360	84,184	29	93,656	1/1 -11/16
1949	12,353	2,470	18,600	40	33,463	1/1 -11/15
1950	10,348	1,852	50,134	72	62,406	1/1 -11/23
1951	18,752	3,121	101,826	8	123,707	1/1 -11/18
1952	20,121	2,883	114,349	27	137,380	1/1 -11/18
1953	31,080	4,001	151,747	40	186,868	1/1 -12/31
1954	33,283	5,406	91,234	44	129,967	1/1 -12/31
1955	25,658	3,141	155,055	39	183,893	5/1 - 9/30
1956	25,085	1,540	92,443	29	119,097	5/1 - 9/29
1957	50,713	3,927	71,261	27	125,928	5/1 - 9/28
1958	32,457	3,970	98,695	60	135,182	5/1 - 9/30
1959	23,352	4,138	72,351	118	99,959	5/4 - 9/30
1960	26,550	6,226	60,341	94	93,211	5/2 -10/29
1961	33,067	7,042	19,233	50	59,392	5/1 -10/27
1962	34,154	7,591	29,253	737	71,735	5/1 -10/27

¹ Annual counts of salmon and steelhead trout given are now considered to be the official record of fish passing Rock Island Dam in period 1933-62.

Table 2.--Monthly number of salmon and steelhead counted at Rock Island Dam, 1962

Species	May	June	July	August	Sept.	Oct.	Total
Chinook	5,472	2,318	6,576	7,392	4,709	569	27,036
Chinook (jacks)	394	589	1,600	2,980	1,454	101	7,118
Steelhead	731	58	158	1,384	3,429	1,831	7,591
Sockeye	2	50	24,762	4,143	282	14	29,253
Coho	0	0	0	1	504	232	737
Totals	6,599	3,015	33,096	15,900	10,378	2,747	71,735

Table 3.--Maximum daily counts, salmon and steelhead, Rock Island Dam, 1962

Species	Date	Number of fish
Chinook (except jacks)	Aug. 10	570
Chinook (jacks)	Aug. 7	173
Steelhead	Sept. 28	284
Sockeye	July 21	2,541
Coho	Sept. 27	70

Table 4.--Number and percent of chinook salmon counted over
 each fish ladder, Rock Island Dam, 1962
 (jacks not included)

Date		Left ladder		Middle ladder		Right ladder		Total
		Number	Percent	Number	Percent	Number	Percent	Number
May	1-15	1,784	51.9	894	26.0	757	22.1	3,435
May	16-31	1,010	49.6	432	21.2	595	29.2	2,037
June	1-15	300	48.2	261	42.0	61	9.8	622
June	16-30	895	52.8	368	21.7	433	25.5	1,696
July	1-15	2,512	64.7	453	11.7	920	23.6	3,885
July	16-31	1,915	71.2	266	9.9	510	18.9	2,691
Aug.	1-15	3,918	73.8	407	7.7	986	18.5	5,311
Aug.	16-31	1,715	82.4	143	6.9	223	10.7	2,081
Sept.	1-15	1,782	75.7	159	6.8	413	17.5	2,354
Sept.	16-30	1,549	65.8	203	8.6	603	25.6	2,355
Oct.	1-15	297	64.2	44	9.5	122	26.3	463
Oct.	16-27	68	64.2	16	15.1	22	20.7	106
Totals		17,745	65.6	3,646	13.5	5,645	20.9	27,036

Table 5.--Number and percent of chinook salmon jacks counted over each fish ladder, Rock Island Dam, 1962

Date		Left ladder		Middle ladder		Right ladder		Total
		Number	Percent	Number	Percent	Number	Percent	Number
May	1-15	56	34.2	54	32.9	54	32.9	164
May	16-31	104	45.2	81	35.2	45	19.6	230
June	1-15	121	40.6	124	41.6	53	17.8	298
Jume	16-30	107	36.8	102	35.0	82	28.2	291
July	1-15	125	37.1	93	27.6	119	35.3	337
July	16-31	737	58.3	213	16.9	313	24.8	1,263
Aug.	1-15	1,401	77.7	106	5.9	297	16.4	1,804
Aug.	16-31	1,040	88.4	68	5.8	68	5.8	1,176
Sept.	1-15	657	76.4	45	5.2	158	18.4	860
Sept.	16-30	430	72.4	38	6.4	126	21.2	594
Oct.	1-15	63	71.6	7	7.9	18	20.5	88
Oct.	16-27	8	61.5	1	7.7	4	30.8	13
Totals		4,849	68.1	932	13.1	1,337	18.8	7,118

Table 6.--Number and percent of sockeye salmon counted over each ladder, Rock Island Dam, 1962

Date		Left ladder		Middle ladder		Right ladder		Total
		Number	Percent	Number	Percent	Number	Percent	Number
May	1-15	0	0	0	0	0	0	0
May	16-31	1	50.0	0	0	1	50.0	2
June	1-15	4	80.0	1	20.0	0	0	5
June	16-30	22	48.9	10	22.2	13	28.9	45
July	1-15	1,604	47.3	744	21.9	1,044	30.8	3,392
July	16-31	10,018	46.9	4,739	22.2	6,613	30.9	21,370
Aug.	1-15	1,697	50.2	716	21.2	967	28.6	3,380
Aug.	16-31	546	71.6	104	13.6	113	14.8	763
Sept.	1-15	165	72.7	25	11.0	37	16.3	227
Sept.	16-30	44	80.0	3	5.5	8	14.5	55
Oct.	1-15	14	100.0	0	0	0	0	14
Oct.	16-27	0	0	0	0	0	0	0
Totals		14,115	48.3	6,342	21.7	8,796	30.0	29,253

Table 7.--Number and percent of coho salmon counted over each ladder, Rock Island Dam, 1962

Date		Left ladder		Middle ladder		Right ladder		Total
		Number	Percent	Number	Percent	Number	Percent	Number
May	1-15	0	0	0	0	0	0	0
May	16-31	0	0	0	0	0	0	0
June	1-15	0	0	0	0	0	0	0
June	16-30	0	0	0	0	0	0	0
July	1-15	0	0	0	0	0	0	0
July	16-31	0	0	0	0	0	0	0
Aug.	1-15	0	0	0	0	0	0	0
Aug.	16-31	0	0	0	0	1	100.00	1
Sept.	1-15	28	93.3	0	0	2	6.7	30
Sept.	16-30	354	74.7	22	4.6	98	20.7	474
Oct.	1-15	169	81.2	6	2.9	33	15.9	208
Oct.	16-27	19	79.2	1	4.1	4	16.7	24
Totals		570	77.3	29	3.9	138	18.8	737

Table 8.--Number and percent of steelhead trout counted over each ladder, Rock Island Dam, 1962

Date		Left ladder		Middle ladder		Right ladder		Total
		Number	Percent	Number	Percent	Number	Percent	Number
May	1-15	136	29.4	166	35.9	161	34.7	463
May	16-31	96	35.8	71	26.5	101	37.7	268
June	1-15	8	19.5	26	63.4	7	17.1	41
June	16-30	12	70.6	4	23.5	1	5.9	17
July	1-15	9	64.3	1	7.1	4	28.6	14
July	16-31	70	48.6	33	22.9	41	28.5	144
Aug.	1-15	361	67.7	46	8.6	126	23.7	533
Aug.	16-31	654	76.8	80	9.4	117	13.8	851
Sept.	1-15	794	76.1	81	7.8	168	16.1	1,043
Sept.	16-30	1,844	77.3	213	8.9	329	13.8	2,386
Oct.	1-15	1,047	75.8	153	11.1	182	13.1	1,382
Oct.	16-27	334	74.4	42	9.4	73	16.2	449
Totals		5,365	70.7	916	12.1	1,310	17.2	7,591

Table 9.--Daily temperatures, stream flow, and fish count data, Rock Island Dam, May 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	°F.	°F.	°F.	Min.	Number	Number
May	74	40	46	46	46	173,400	8	15
	67	45	47	46	46	170,000	15	21
	60	45	47	46	46	162,200	8	16
	65	33	48	47	47	172,300	20	19
	60	36	48	47	47	155,800	41	26
	64	41	49	48	47	155,800	309	56
	64	40	48	48	48	147,800	196	35
	60	50	50	49	49	162,200	383	15
	58	46	48	48	48	168,800	473	85
	60	48	50	49	49	166,500	350	29
	58	46	48	48	48	167,700	353	25
	60	48	50	50	50	167,700	302	31
	65	45	47	46	46	165,400	514	41
	60	45	47	46	46	165,400	315	16
	75	51	51	50	50	165,400	312	33
	60	45	47	46	46	163,300	150	21
	75	51	52	52	52	155,800	352	11
	67	51	52	52	52	154,800	226	24
	78	52	52	52	52	155,800	288	28
	74	50	50	49	49	161,200	220	28
	74	50	54	54	54	160,100	83	11
	75	51	53	53	53	171,100	136	11
	74	51	52	52	52	168,800	152	15
	79	51	52	52	52	198,000	84	12
	80	51	51	51	51	209,900	121	17
	52	51	51	51	51	231,500	122	14
	65	51	52	52	52	252,300	83	17
	65	50	54	54	54	267,500	40	7
	75	51	52	52	52	293,500	45	17
	75	51	52	52	52	299,200	59	23
	68	50	53	53	53	301,100	106	8
	68	50	53	53	53			114
	72	54	53	53	53			

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 10.--Daily temperatures, stream flow, and fish count data, Rock Island Dam, June 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	°F	°F	°F	Number	Number	Number
June 1	75	52	54	52	309, 900	84	94	
2	63	58	53	53	315, 100	79	80	
3	73	42	53	52	318, 600	73	79	
4	73	45	54	52	320, 300	48	53	
5	66	52	55	53	326, 900	83	84	
6	77	49	55	54	306, 400	63	63	
7	86	58	56	56	311, 600	58	64	
8	89	63	57	55	308, 100	82	86	
9	80	56	57	55	291, 600	50	53	
10	76	57	57	55	297, 300	63	67	
11	82	52	57	55	308, 100	40	42	
12	76	60	57	56	302, 900	3	3	
13	62	51	56	55	282, 000	1	1	
14	82	53	56	55	295, 400	21	21	
15	91	62	57	55	276, 600	64	65	
16	88	66	57	56	291, 600	20	21	
17	83	61	57	56	282, 000	10	12	
18	88	59	57	56	265, 700	51	53	
19	91	60	57	56	255, 600	56	58	
20	89	64	57	56	252, 300	86	91	
21	88	60	58	56	250, 600	53	55	
22	90	64	58	57	257, 300	104	121	
23	86	62	58	57	260, 900	69	74	
24	95	66	58	57	260, 900	0	100	
25	92	70	58	57	253, 900	76	77	
26	75	56	59	58	252, 300	156	158	
27	79	54	59	58	233, 100	3	174	
28	85	52	59	58	237, 800	173	175	
29	93	58	59	58	228, 500	469	476	
30	86	62	59	58	231, 500	5	350	

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 11.--Daily temperatures, stream flow, and fish count data, Rock Island Dam, July 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Number
July 1	72	58	59	58	227,000	409	0	449
2	75	45	59	58	224,100	16	0	363
3	72	53	59	58	230,000	23	2	343
4	79	52	59	58	233,100	36	1	320
5	70	56	59	58	228,500	54	1	353
6	72	53	60	58	234,700	69	0	360
7	84	52	60	59	237,800	113	3	205
8	91	68	64	60	225,500	209	2	531
9	91	92	64	61	215,300	140	1	305
10	94	87	61	62	207,200	271	0	411
11	75	83	62	62	204,500	278	0	628
12	83	85	59	62	195,400	267	0	667
13	83	85	54	62	186,500	200	3	683
14	73	61	57	61	195,400	238	1	839
15	83	85	54	62	201,800	239	0	1,171
16	73	61	61	61	196,700	273	0	985
17	85	88	57	61	181,700	196	1	1,064
18	85	88	58	61	190,200	187	3	1,474
19	88	91	59	61	182,900	206	6	1,776
20	91	67	63	61	171,100	151	0	1,945
21	97	94	68	62	173,400	187	0	2,692
22	94	108	73	63	172,300	273	2	2,332
23	97	104	74	63	174,600	303	0	1,977
24	97	102	76	64	174,600	210	5	2,264
25	95	102	72	64	156,900	270	1	1,452
26	102	104	74	63	151,800	248	7	1,821
27	95	102	72	63	156,900	160	10	1,418
28	102	99	71	65	152,800	880	0	1,063
29	99	102	73	65	165,400	263	18	1,140
30	102	98	68	64	179,200	333	0	924
31						450	25	1,141

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 12.--Daily temperatures, stream flow, and fish count data, Rock Island Dam, August 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Coho	Steelhead	Total
	Max.	Min.	Max.	Min.	Number	Number
Aug.	95	70	63	62	305	825
	92	71	62	61	503	1,237
	75	61	62	62	583	972
	75	57	63	62	489	944
	78	57	62	61	466	770
	74	61	62	62	558	764
	80	57	63	62	360	882
	85	56	61	60	450	27
	84	61	63	61	541	34
	90	62	62	60	681	31
	86	56	62	61	174	27
	85	58	62	60	168	27
	91	63	61	60	507	37
	93	62	62	60	139	48
	88	62	62	60	100	49
	88	64	62	61	316	31
	88	64	62	61	94	47
	84	61	62	61	123	26
	84	58	62	61	300	26
	91	62	62	61	107	26
	93	62	62	61	900	26
	88	64	62	61	586	26
	88	64	62	61	116	26
	88	64	62	61	116	26
	84	61	62	61	116	26
	84	61	62	61	100	26
	84	61	62	61	652	26
	90	62	62	61	272	26
	86	56	62	61	67	26
	86	56	62	61	65	26
	85	58	62	61	101	26
	91	62	62	61	224	26
	93	62	62	61	101	26
	88	64	62	61	101	26
	88	64	62	61	59	26
	88	64	62	61	207	26
	84	61	62	61	65	26
	84	61	62	61	308	26
	84	61	62	61	174	26
	90	62	62	61	214	26
	90	62	62	61	43	26
	90	62	62	61	37	26
	90	62	62	61	44	26
	90	62	62	61	59	26
	90	62	62	61	60	26
	90	62	62	61	750	26
	90	62	62	61	361	26
	90	62	62	61	793	26
	86	56	62	61	387	26
	86	56	62	61	41	26
	85	58	62	61	48	26
	85	58	62	61	44	26
	85	58	62	61	61	26
	85	58	62	61	41	26
	85	58	62	61	48	26
	85	58	62	61	44	26
	85	58	62	61	60	26
	85	58	62	61	75	26
	85	58	62	61	51	26
	85	58	62	61	66	26
	85	58	62	61	49	26
	85	58	62	61	51	26
	85	58	62	61	64	26
	85	58	62	61	38	26
	85	58	62	61	17	26

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 13.--Daily Temperatures, stream flow, and fish count data, Rock Island Dam, September 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	°F	°F	°C.f.s.	Number	Number	Number
Sept. 1	92	66	63	62	83, 600	245	38	318
2	86	63	63	62	88, 200	27	68	262
3	83	61	63	62	89, 500	166	44	239
4	87	55	63	62	70, 800	208	40	266
5	89	54	63	62	77, 100	210	1	301
6	95	65	63	62	60, 500	88	1	137
7	72	66	63	62	68, 500	147	0	230
8	70	47	63	62	43, 400	136	2	226
9	77	46	63	62	54, 900	253	0	367
10	66	54	62	61	77, 800	291	3	395
11	69	49	61	61	67, 900	179	2	279
12	72	60	61	60	62, 200	269	0	342
13	69	51	61	60	56, 000	394	70	497
14	74	51	61	60	44, 300	306	97	422
15	86	52	61	60	44, 300	142	79	233
16	82	50	62	61	45, 200	187	5	299
17	84	55	62	61	58, 800	245	7	338
18	86	70	62	61	44, 300	163	56	225
19	90	59	62	62	41, 200	186	5	320
20	91	63	62	62	35, 800	244	121	397
21	85	64	63	62	42, 300	212	123	371
22	84	53	63	62	35, 900	406	132	590
23	86	54	64	63	38, 200	197	5	432
24	86	54	63	62	48, 700	194	47	479
25	80	54	64	63	51, 200	160	3	406
26	85	54	63	63	51, 200	263	4	521
27	75	61	62	62	48, 200	153	70	488
28	60	53	63	62	47, 800	168	56	511
29	67	48	62	61	53, 800	107	3	287
30	72	43	62	61	44, 800	64	25	200

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 14.--Daily temperatures, stream flow, and fish count data, Rock Island Dam, October 1962

Date	Air temperatures ¹	Water temperatures ²	Stream flow	Chinook	Sockeye	Coho	Steelhead	Total
	Max.	Min.	Max.	Min.	Max.	Min.	Number	Number
Oct. 1	74	45	--	--	49,700	92	26	184
2	75	51	--	--	45,600	77	27	156
3	70	53	--	--	45,600	91	5	153
4	69	47	--	--	47,800	24	33	137
5	64	44	--	--	46,500	62	17	116
6	63	48	--	--	34,700	42	0	91
7	51	38	--	--	40,200	31	18	60
8	58	35	59	59	45,600	16	9	80
9	58	44	59	59	45,600	15	13	86
10	51	44	59	58	38,000	25	8	76
11	49	45	59	58	37,300	11	39	39
12	50	45	58	57	48,700	12	0	56
13	65	46	58	57	46,900	20	1	51
14	62	43	57	57	69,600	19	7	37
15	62	45	58	57	54,300	14	7	60
16	58	37	58	57	39,400	9	2	54
17	64	41	58	57	50,200	16	0	47
18	63	44	58	57	46,500	9	3	47
19	58	43	58	58	52,200	11	1	22
20	64	47	58	58	48,200	14	0	17
21	70	47	59	59	46,100	6	0	42
22	68	48	59	58	50,200	10	0	23
23	70	43	59	58	46,900	21	1	47
24	67	44	59	58	75,900	6	3	51
25	64	45	58	58	75,900	10	0	53
26	58	42	58	58	74,600	2	0	34
27	54	42	58	58	55,400	5	0	33

¹ Air temperatures, taken with pocket thermometer, are given in degrees Fahrenheit.² Water temperatures, taken with recording thermograph at middle ladder, are given in degrees Fahrenheit.

Table 15.—Miscellaneous fish count, Rock Island Dam, May 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Dolly Varden	Shad	Rainbow trout	Total
May 1	4	6	22	0	0	0	0	0	0	26
2	3	4	41	1	0	0	0	0	48	
3	4	18	57	0	0	0	0	0	61	
4	5	10	150	0	0	0	0	0	168	
5	6	16	85	72	0	0	0	0	121	
6	7	30	70	68	0	0	0	0	101	
7	8	14	50	52	0	0	0	0	111	
8	9	109	93	96	0	0	0	0	97	
9	10	53	108	55	0	0	0	0	103	
10	11	21	56	33	0	0	0	0	79	
11	12	22	18	38	0	0	0	0	119	
12	13	38	13	38	0	0	0	0	153	
13	14	21	69	32	0	0	0	0	271	
14	15	371	40	44	0	0	0	0	444	
15	16	248	299	11	0	0	0	0	373	
16	17	266	40	19	0	0	0	0	149	
17	18	299	44	18	0	0	0	0	91	
18	19	40	11	43	0	0	0	0	74	
19	20	44	19	31	0	0	0	0	260	
20	21	197	12	34	0	0	0	0	215	
21	22	172	5	15	0	0	0	0	1,259	
22	23	1,264	13	35	0	0	0	0	1,330	
23	24	1,196	49	37	0	0	0	0	1,501	
24	25	1,384	96	17	0	0	0	0	1,890	
25	26	1,762	17	20	0	0	0	0	585	
26	27	501	10	12	0	0	0	0	277	
27	28	227	34	31	0	0	0	0	165	
28	29	117	4	0	0	0	0	0	209	
29	30	166	0	0	0	0	0	0		
30	31	0	0	0	0	0	0	0		
Total		8,815	560	1,571	177	0	0	0	7	11,130

Table 16.—Miscellaneous fish count, Rock Island Dam, June 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
June 1	261	40	7	36	0	0	0	0	0	344
2	714	54	30	1	6	26	0	0	0	834
3	155	13	0	0	0	20	0	0	169	169
4	31	3	9	34	20	56	0	0	40	40
5	195	16	12	37	54	24	0	0	247	247
6	125	38	33	39	12	14	0	0	195	195
7	675	106	40	40	6	11	0	0	848	848
8	3,520	33	39	39	12	14	0	0	1,057	1,057
9	884	77	75	75	12	14	0	0	733	733
10	592	22	22	22	9	13	0	0	423	423
11	371	44	45	106	56	22	0	0	285	285
12	218	44	133	162	34	12	0	0	202	202
13	107	45	107	349	12	12	0	0	249	249
14	397	107	107	162	4	12	0	0	694	694
15	1,988	107	107	349	35	8	0	0	588	588
16	1,083	107	107	123	21	20	0	0	1,312	1,312
17	479	107	107	123	12	14	0	0	1,277	1,277
18	309	107	107	123	12	14	0	0	540	540
19	984	107	107	123	12	14	0	0	1,114	1,114
20	1,734	107	107	123	12	14	0	0	2,105	2,105
21	1,859	107	107	123	12	14	0	0	1,747	1,747
22	1,565	107	107	123	12	14	0	0	1,412	1,412
23	1,237	107	107	123	12	14	0	0	1,962	1,962
24	1,672	107	107	123	12	14	0	0	2,113	2,113
25	1,838	107	107	123	12	14	0	0	1,176	1,176
26	1,942	107	107	123	12	14	0	0	1,849	1,849
27	1,652	107	107	123	12	14	0	0	1,747	1,747
28	1,573	107	107	123	12	14	0	0	1,293	1,293
29	1,147	107	107	123	12	14	0	0		
Total	28,440	3,281	570	1,499	53	11	0	3	4	33,861

Table 17.—Miscellaneous fish count, Rock Island Dam, July 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Dolly Varden	Shad	Trout	Rainbow Trout	Total
July 1	1,063	132	27	89	15	3	0	1	0	1	1,330
2	886	64	4	39	12	0	0	0	1	0	1,006
3	870	60	7	40	11	0	0	0	0	0	989
4	743	44	7	35	20	8	0	0	0	0	647
5	554	43	3	39	20	0	0	0	0	0	1,346
6	1,113	117	13	83	49	0	0	0	0	0	953
7	729	139	21	49	152	24	5	0	0	0	3,595
8	3,091	311	4	154	17	0	0	0	0	0	3,752
9	3,436	242	3	154	31	1	1	0	0	0	2,598
10	2,352	114	7	93	40	3	1	0	0	0	1,456
11	1,239	103	7	66	31	24	5	0	0	0	976
12	767	101	5	58	24	3	2	0	0	0	613
13	410	107	9	69	31	2	0	0	0	0	1,012
14	457	77	2	58	24	1	1	0	0	0	743
15	774	115	0	34	26	0	0	0	0	0	443
16	627	40	5	94	35	3	0	0	0	0	595
17	324	40	4	45	30	0	0	0	0	0	317
18	237	26	12	45	38	0	0	0	0	0	293
19	183	41	4	45	30	0	0	0	0	0	342
20	174	53	17	49	30	0	0	0	0	0	585
21	271	108	52	22	16	0	0	0	0	0	977
22	734	99	25	66	22	0	0	0	0	0	1,507
23	1,112	212	6	95	24	0	0	0	0	0	1,836
24	1,540	101	8	143	32	0	0	0	0	0	790
25	640	57	5	122	62	0	0	0	0	0	737
26	560	56	12	66	40	0	0	0	0	0	782
27	495	123	30	66	58	0	0	0	0	0	762
28	438	128	24	104	60	0	0	0	0	0	778
29	408	139	19	134	63	3	0	0	0	0	1,099
30	856	83	10	47	98	0	0	0	0	0	1,325
31	1,081	94	10	40	92	6	0	0	0	0	28,164
Total		3,069	368	2,281	1,071	66	0	2	17	17	35,038

Table 18.—Miscellaneous fish count, Rock Island Dam, August 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Warden	Rainbow Trout	Total
Aug.	543	71	14	16	37	7	0	0	0	688
	471	49	17	11	38	4	0	0	0	591
	443	64	12	16	77	3	0	0	0	617
	226	23	7	13	25	26	0	0	0	309
	109	26	9	16	17	17	0	0	0	222
	172	42	10	14	25	25	0	0	0	246
	828	45	16	11	26	26	0	0	0	938
	788	20	12	2	21	21	0	0	0	891
	348	14	13	10	22	22	0	0	0	405
	9	34	35	10	22	22	0	0	0	774
	710	67	26	19	10	18	0	0	0	1,068
	949	70	46	31	19	9	0	0	0	1,531
	1,362	46	33	31	10	5	0	0	0	1,034
	1,942	85	57	61	101	8	0	0	0	1,066
	11	829	57	61	67	13	0	0	0	1,031
	12	711	492	351	133	9	0	0	0	1,031
	13	687	547	51	134	6	0	0	0	1,031
	14	497	547	51	117	6	0	0	0	1,031
	15	18	547	51	105	12	0	0	0	1,031
	16	17	547	51	135	12	0	0	0	1,031
	17	547	547	51	68	12	0	0	0	1,031
	18	547	547	51	64	19	0	0	0	1,031
	19	351	547	51	48	18	0	0	0	1,031
	20	449	326	39	40	24	0	0	0	1,031
	21	326	385	54	40	24	0	0	0	1,031
	22	385	518	40	48	24	0	0	0	1,031
	23	518	435	40	92	11	0	0	0	1,031
	24	435	548	109	89	6	0	0	0	1,031
	25	548	365	74	28	5	0	0	0	1,031
	26	365	321	26	105	3	0	0	0	1,031
	27	321	365	33	28	0	0	0	0	1,031
	28	365	76	18	107	3	0	0	0	1,031
	29	840	61	32	132	8	0	0	0	1,031
	30	625	57	25	116	3	0	0	0	1,031
	31	737								1,031
Total		17,422	1,550	878	1,880	555	1,380	1	14	23,631

Table 19.—Miscellaneous fish count, Rock Island Dam, September 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
Sept. 1	775	76	43	143	6	157	0	0	0	1,200
2	785	52	43	107	4	48	0	0	0	1,040
3	540	26	12	111	5	58	0	0	0	752
4	579	14	43	199	1	124	0	0	0	960
5	733	27	43	194	0	91	0	0	0	1,088
6	638	41	53	208	2	67	0	0	0	1,009
7	782	14	65	160	0	54	0	0	0	1,075
8	777	44	85	161	3	18	0	0	0	1,088
9	635	22	124	276	4	14	0	0	0	1,075
10	765	27	74	280	4	53	0	0	0	1,203
11	387	67	67	133	2	17	0	0	0	614
12	364	77	77	132	2	18	0	0	0	677
13	485	51	51	45	2	39	0	0	0	622
14	657	20	60	98	1	25	0	0	0	883
15	464	39	72	120	1	77	0	0	0	721
16	608	61	145	236	2	122	0	0	0	1,128
17	392	52	99	116	1	8	0	0	0	783
18	358	51	195	137	0	5	0	0	0	750
19	803	98	231	147	0	7	0	0	0	1,284
20	437	41	277	45	0	6	0	0	0	808
21	409	37	407	62	2	33	0	0	0	928
22	205	41	346	62	0	23	0	0	0	690
23	211	81	245	27	0	38	0	0	0	594
24	295	89	345	163	0	27	0	0	0	932
25	295	83	577	128	4	17	0	0	0	1,110
26	537	132	445	87	18	5	0	0	0	1,222
27	200	165	581	103	0	6	0	0	0	1,055
28	371	82	569	82	0	27	0	0	0	1,118
29	92	77	696	36	0	25	0	0	0	880
30	131	77	884	56	0	0	0	0	0	1,173
Total	14,710	1,581	6,954	3,854	72	1,284	0	2	5	28,462

Table 20.--Miscellaneous fish count, Rock Island Dam, October 1962

[Number of fish]

Date	Sucker	Squawfish	Whitefish	Chub	Carp	Lamprey	Shad	Dolly Varden	Rainbow trout	Total
Oct. 1	564	238	39	651	39	38	0	0	0	1,352
2	158	35	57	500	61	9	18	0	0	848
3	230	59	25	600	34	32	36	0	0	845
4	146	25	73	666	62	30	29	0	0	1,047
5	125	16	38	823	29	16	6	0	0	1,094
6	229	29	59	647	29	17	3	0	0	856
7	111	55	16	626	16	6	10	0	0	963
8	104	31	22	1,592	17	5	1	0	0	1,663
9	10	20	20	1,265	26	22	3	0	0	844
10	112	13	14	785	5	8	2	0	0	673
11	14	15	16	505	5	4	3	0	0	1,373
12	15	17	18	791	22	3	6	0	0	963
13	16	20	21	588	4	3	2	0	0	1,111
14	17	20	21	1,057	3	2	3	0	0	369
15	17	21	21	1,242	13	13	6	0	0	657
16	18	21	21	840	7	4	2	0	0	1,111
17	18	21	21	744	4	3	1	0	0	369
18	19	21	21	836	5	5	3	0	0	972
19	19	21	21	928	5	5	6	0	0	972
20	20	21	21	1,325	2	2	3	0	0	972
21	21	21	21	1,230	6	6	3	0	0	972
22	22	22	22	863	0	0	0	0	0	972
23	23	23	23	1,350	3	3	2	0	0	972
24	24	24	24	1,566	5	5	4	0	0	972
25	25	25	25	2,720	5	5	4	0	0	972
26	26	26	26	1,752	1	1	1	0	0	972
27	27	27	27	1,476	8	8	4	0	0	972
Total	2,850	903	27,968	414	5	256	0	2	4	32,402

Table 21.--Injured fish observed at Rock Island Dam, May 1-October 27, 1962
 [Number of fish]

Date	Species	Total fish counted	Injured fish observed			
			Left ladder	Middle ladder	Right ladder	Total
May 1-15	Chinook	3,436	30	4	4	38
	Chinook jacks	164				
	Steelhead	463	2	2	1	5
May 16-31	Chinook	2,037	15	2		17
	Chinook jacks	230				
	Sockeye	2				
	Steelhead	268				
June 1-15	Chinook	622	11	1		12
	Chinook jacks	298				
	Sockeye	5				
	Steelhead	41				
June 16-30	Chinook	1,696	16	1	5	22
	Chinook jacks	291	1			1
	Sockeye	45				
	Steelhead	17				
July 1-15	Chinook	3,885	30	2	12	44
	Chinook jacks	337				
	Sockeye	3,392	3		2	5
	Steelhead	14				
July 16-31	Chinook	2,691	16	3	1	20
	Chinook jacks	1,263	1			1
	Sockeye	21,370	21	7	26	54
	Steelhead	144				
Aug. 1-15	Chinook	5,311	27	4	7	38
	Chinook jacks	1,804				
	Sockeye	3,380	13	2	8	23
	Steelhead	533				
Aug. 16-31	Chinook	2,081	11	2	2	15
	Chinook jacks	1,176				
	Sockeye	763	7		1	8
	Steelhead	851				
Sept. 1-15	Chinook	2,354	12	4	1	17
	Chinook jacks	860				
	Sockeye	227	4			4
	Steelhead	1,043	1			1
	Coho	30				
Sept. 16-30	Chinook	2,355	8	2	3	13
	Chinook jacks	594				
	Sockeye	55	1			1
	Steelhead	2,386	2		1	3
	Coho	474	1			1
Oct. 1-15	Chinook	463	6		4	10
	Chinook jacks	88				
	Sockeye	14				
	Steelhead	1,382	2		3	5
	Coho	208	2			2
Oct. 16-27	Chinook	106	2			2
	Chinook jacks	13				
	Steelhead	449	2			2
	Coho	24				
Totals		71,735	247	36	81	364



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